Android Based Application using Google Maps API for Tourism Travel Guide

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Abstract – *This research aims to design, build, and implement an application that able to increase knowledge and interest of society to tourism of Jakarta by providing various information about tourist location in DKI Jakarta as well as giving guide of travel route to tourist location, as guide in doing tourism activity to location – location of tourism in DKI Jakarta. This application development method uses waterfall system development methodology that has 5 phases of communication, planning, modeling, construction, and deployment. This application is built using Android Studio IDE, Java programming language, SQLite as database, and utilize Google Maps API to display the map. With this application, people who want to find information about Jakarta tourism can obtain various tourist information and guide the route to tourist locations in Jakarta more quickly and easily.*

Keywords: Android Application, Tour Guide, Google Maps API.

I. Introduction

Information technology plays an important role in various fields in this modern era [1]. The rapid development of information technology is also accompanied by the growing use of mobile devices in everyday life and the rapid development of mobile applications that now have increasingly diverse functions to assist human activities in various fields [2]-[3]-[4]-[5]-[6]. In this modern era, there has been a wide range of mobile applications for smartphone devices capable of supporting various human activities, ranging from communication applications, entertainment applications, social networking applications, shopping applications, productivity applications including applications for tourism and recreation [7]. While tourism is defined as tourist activities supported by various facilities, facilities and services provided by the community, businessmen, and government [8].

The most interesting category is "Travel Guides" that combines "Information Resources" and "Location-Based Services" category [9]. While limited information resources arose, those are transportation information and problems in understanding language [10], and web-based tourism information [11]. The feature of location-based services can be provided by Google Maps Android API [10]-[12]-[13]. Google Maps Direction Android API is a service that can calculate directions between two locations using HTTP requests that can be implemented on Android-based software. In addition, this API can also calculate the distance, number of intersections, and other things that can affect the most efficient route [14].

Applications related to tourism and recreation have been commonly used by the community, such applications consist of tour booking applications, hotel reservation applications and airline tickets, travel planning apps, guide apps, language translator applications and others [2]. The use of supporting applications of tourism, recreation and leisure is commonly used by the general public, especially urban communities such as citizens of DKI Jakarta who need more entertainment because of high stress levels in urban environments. DKI Jakarta has many entertainment, tourism and recreation locations, ranging from zoos, museums, recreational parks, and so forth to meet the need for entertainment for the citizens of DKI Jakarta. However, based on survey results conducted on Jakarta citizens as many as 50 respondents, 84% of respondents admitted to being reluctant to travel to tourist locations in Jakarta and prefer to vacation outside the area of Jakarta.

Based on background the formulation of the problems are (1) create an application that can increase the knowledge and interest of users of tourism in Jakarta, create an application that can help users to find routes to tourist sites located in the area of DKI Jakarta, application that can recommend a tourist location located in DKI Jakarta based on user interest? (2) how to create an application that can provide tourist information such as the price of admission, operating hours, phone numbers, available facilities, and other additional information from various tourist sites located in the area of DKI Jakarta?

This research aims to design, build, and implement an application that able to increase knowledge and interest of society to tourism of Jakarta by providing various information about tourist location in DKI Jakarta as well as giving guide of travel route to tourist location, as guide in doing tourism activity location to location of tourism in DKI Jakarta. People who want to find information about Jakarta tourism can obtain various tourist information and guide the route to tourist

locations in Jakarta more quickly and easily.

The rest of the paper is organized as follows, Section II describes related researches about mobile tourism application using Google Maps API will be discussed. The Proposed design system using UML and flowchart of the system will be breakdown in section III. Section IV talks about application implementation developed in mobile based and also testing of the application at the end section. Finally, Section V is about drawn of conclusions.

II. Related Research

Nozhenkov and Korobko proposed two kinds of applications for the support of tourism in Krasnoyarsk region: mobile application and online web-system [15]. The developed mobile applications and the tourism monitoring web-system are adapted to the Russian legislation and allow to provide new-quality to tourist's safety due to direct interaction with the emergency services. Applications have been developed on the basis of modern informational technologies using standard functionality of smartphones, tablets and other devices with Internet, which makes it accessible for most of the modern tourists.

Aoyagi et al. proposed the effectiveness of providing real-time traffic congestion estimates to increase tourism-related additional stopovers [16].This congestion can be mitigated if tourists delayed their departure of homeward trips to avoid peak traffic hours. A potential method to promote staggered departure times is providing the estimates of near-future traffic congestion. hypothesized and experimentally confirmed that some tourists would delay their departure to avoid traffic based on near-future traffic estimates. The experiment was conducted in the Yatsugatake area using a mobile application that provided this information to tourists. The results suggest that approximately 40% of self-driving tourists will perform an additional stopover if the returning route is congested and a near-future traffic congestion estimate is provided.

Filocamo et al. proposed geotourism that represents a powerful and new form of sustainable tourism that has rapidly expanded worldwide over the last decades [17]. To promote it, the use of digital and geomatic tools is becoming of increasing importance. Mobile information especially represents one of the most efficient and smart ways to bring geotourism closer to a wide audience. This applies in particular to rural and inner areas, where the exploitation of geoheritage can represent a crucial resource for eco-friendly and sustainable tourism development.

Lin, Li and Zhou, proposed social media and oblique photography, conducts a case study of the Pingtan comprehensive experimental area in China, and develops an app about online travelling to provide corresponding information for consumers' decisions [18]. This study also discusses the potential value of the app, i.e., assisting the development of smart travel in city, achieving sustainable development of tourism, and contributing to tourism globally.

III. Design System

III.1. *Use Case Diagram*

The picture above is a use case diagram illustrating the functionality of the DKI Jakarta tourist guide application and the interaction between the actors involved, in this case the user, with the tourist guide application of DKI Jakarta. From the diagram above can be seen that there are three main functions of the tour guide application of DKI Jakarta is to see the tourist location information, look for routes to tourist sites and see tourist maps DKI Jakarta.
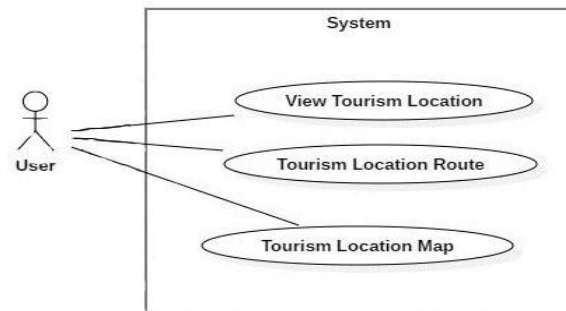

Fig. 1. Use Case Diagram

III.2. *System Flowchart*

The following figure is a flowchart that describes the flow run by this application when used by the user
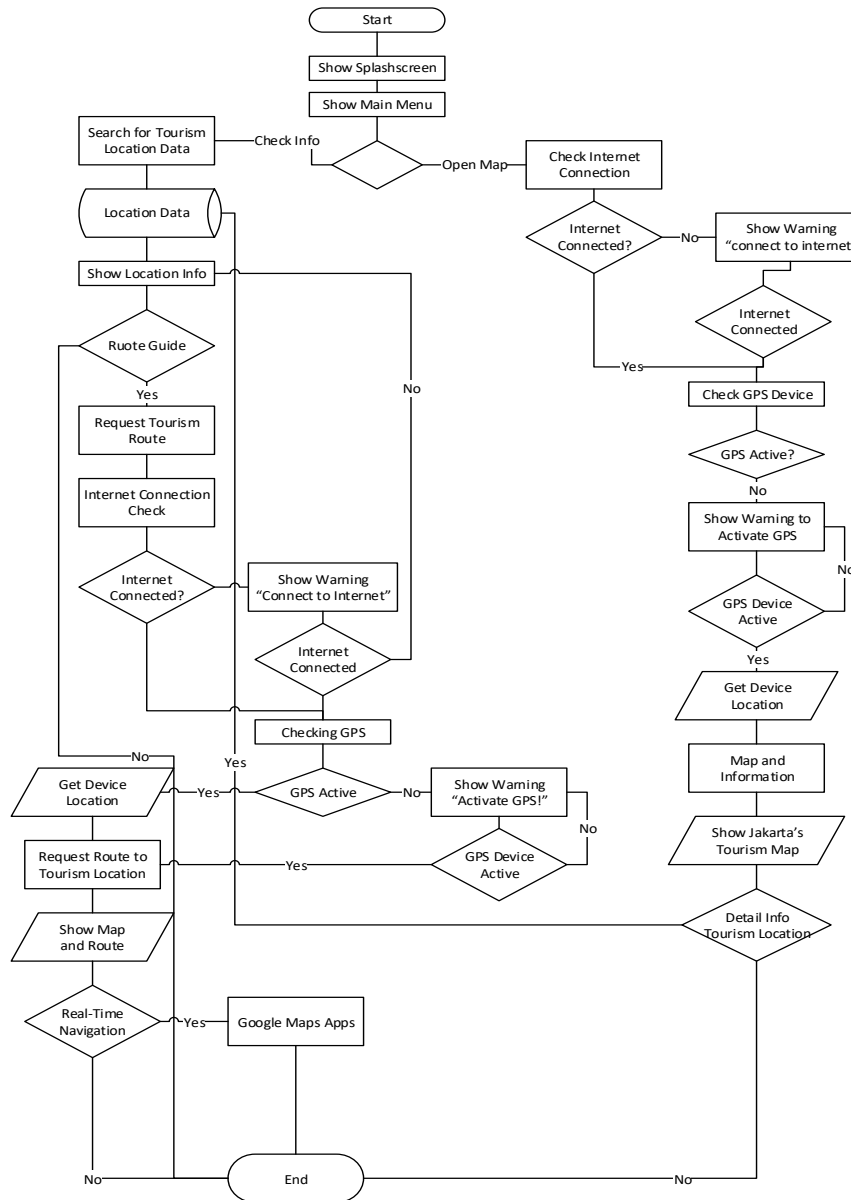
Fig. 2. Flowchart of the System

III.3. *Class Diagram*

Class Diagram The following figure is a class diagram design of the android-based DKI Jakarta based travel guide that describes the relationship between classes and activities in this application. The design of the above class diagram consists of several components in the application you want to build, the components include package, class, attribute, operation, and association.
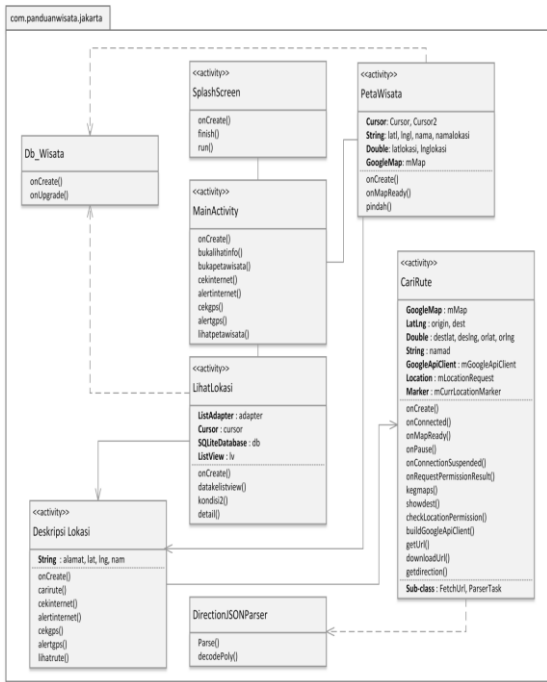
Fig. 3. Class Diagram

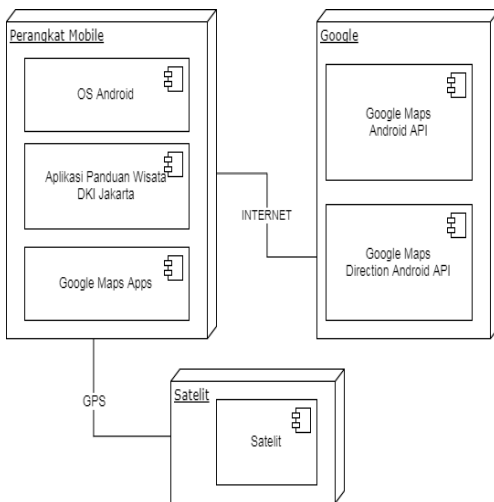### III.4. *Deployment Diagram*

Fig. 4. Deployment Diagram

The picture above is a deployment diagram of Jakarta-based tourism guide application, which describes the relationship between nodes as a unity of system architecture and execution environment of Jakarta tourist guide application.

III.5. *Navigation Diagram*

The following figure is a navigation diagram of the DKI Jakarta tourist guide application. Navigation diagram describes the relationship between the user interface menus in the application guidance of DKI Jakarta. This navigation diagram illustrates the interaction of the components that exist in the application guidance of DKI Jakarta.
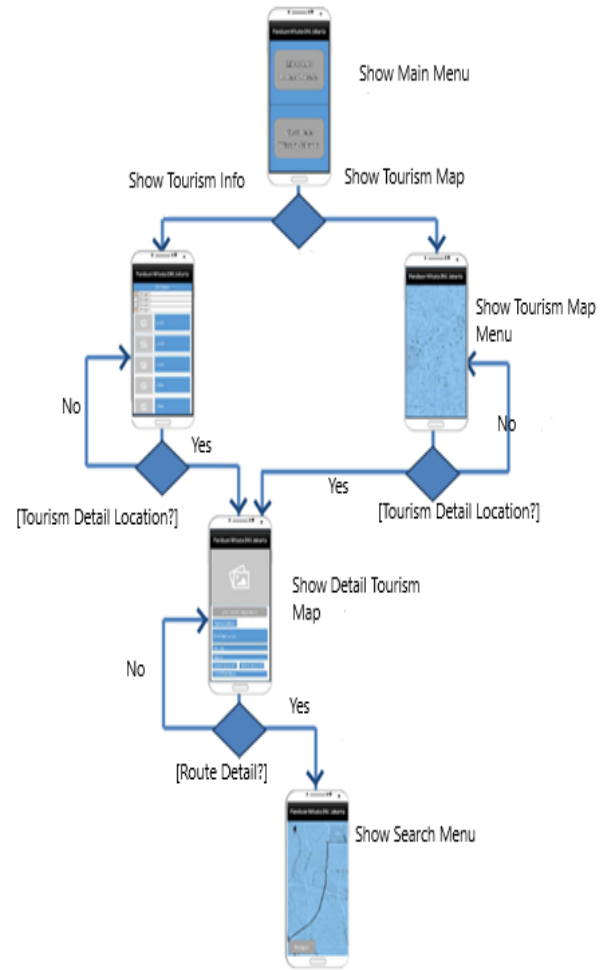

Fig. 5. Navigation Diagram

IV. Implementation

Fig. 6. Display of Splash Screen
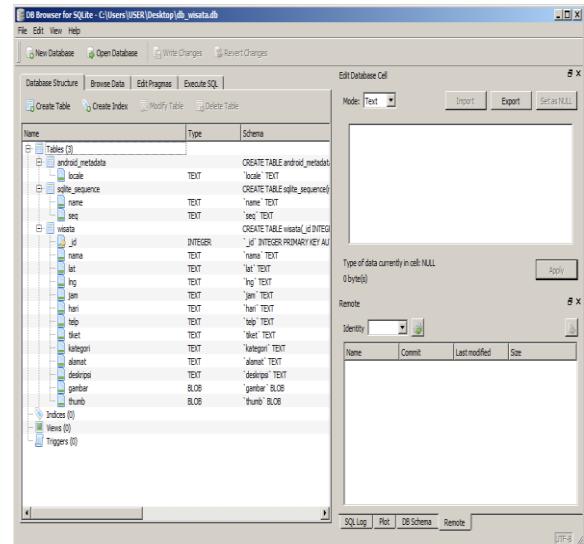
Fig. 7. Display of Jakarta Tourist Map Menu

Fig. 9. Structure of Database

The picture above is the result of database implementation from Jakarta tourist guide application, from application database file that is db_wisata file. android_metadata table which is a table that is generated automatically by the application to store metadata from this application, sqlite_sequence table which is a table that is generated automatically by the application because this database has a table in which there is a field with auto increment, and a tour table which is a table containing data that will be accessed by the DKI Jakarta tourist guide app to provide information related to the tourist location required by the user
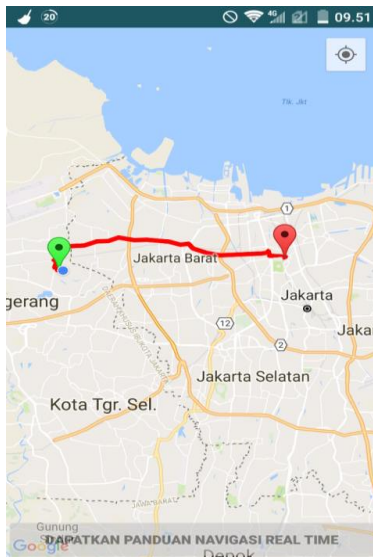

Fig. 8. Display of Find Route to Location Tour Menu

IV.1 Database Implementation

This DKI Jakarta Tour Guide application uses SQLite as its database. By default, SQLite databases are private and database files can only be accessed by applications. To see the results of the implementation of the database of this tour guide application, the author uses a rooted emulator in order to access files from applications that have been installed in the emulator. The following is the contents of the database of the DKI Jakarta tourist guide application that has been taken from the emulator device and opened using the application SQLite Browser:
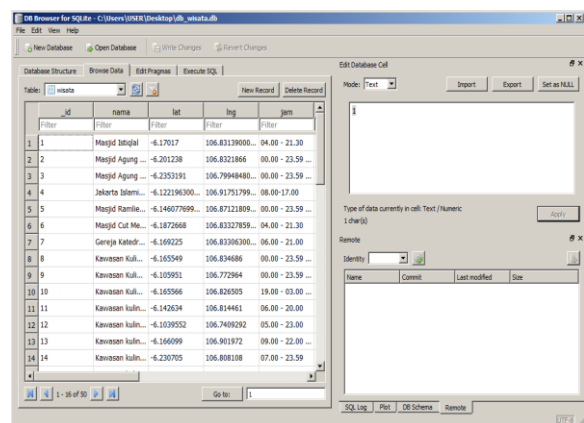

Fig. 10. Table of Content of Tourism

IV.2   Testing

At this stage, testing of the application has been made. The method used in this test is the Black Box testing method, which is testing the application in terms of its functionality.

TABLE I.
OPENING TESTING VIEW

Testing Scenario	Expected Result	Result
Selecting Application Icon Jakarta Travel Guide.	The app launches successfully	☒Success ☐Failed

TABLE II
MAIN MENU OF TESTING

Scenario Testing	Expected Result	Result
Open Main Menu	The main menu appears without error	☒Success ☐Failed
Press the button to find info	Move to Tour List Location Tour view without error	☒Success ☐Failed
Choosing a button map jakarta tour with certain conditions (related internet and gps)	Checking the internet and gps conditions of the device, if both are active, move to DKI Jakarta Tour Map view menu, otherwise dialog alert will appear	☒Success ☐Failed

TABLE III
TESTING TABLE MAP TOUR MENU

Testing Scenario	Expected Result	Result
Opening menu jakarta tour map.	Menu map jakarta tour appear without error, map also displayed well.	☒Success ☐Failed
Choose each marker displayed in the map.	Each of the selected markers will display the location name snippet	☒Success ☐Failed
Selects each location name on the snippet marker of the marker selected by the user.	Each location name on the selected snippet will make the app display the Menu Description Tour Location displays the tour location data from the selected snippet	☒Success ☐Failed

TABLE IV
Table of Testing List of Tour Locations Menu

Testing Scenario	Expected Result	Result
Open the tour list menu.	Tour list location menu appears without error	☒Success ☐Failed
Selecting each list of items contained in the menu list of tourist locations	Each list item on the menu lists the location of the tour displays data from the database and can run the function intent to display Menu Description Tour location.	☒Success ☐Failed
Checking checkboxes for category of tourist locations with different combinations available	Checkbox filters filter out the display of tourist locations on the list view according to the selected check box combination (there are 17 kinds of combinations)	☒Success ☐Failed

TABLE V
Description Tour Location Menu

Testing Scenario	Expected Result	Result
Open the tour description menu by selecting a tourist location from the tour list menu	Displays menu description of tourist location with complete components and without error.	☒Success ☐Failed
Opening menu description of tourist location by choosing tourist location from jakarta tour map menu	Displays menu description of tourist location with complete components and without error.	☒Success ☐Failed
Select a button see the route to a tour location with certain conditions (internet & gps)	Checking the internet and gps conditions of the device, if both are active, move to Route Search Menu view to Tour Location, otherwise dialog alert will appear..	☒Success ☐Failed

TABLE VI
Testing Menu to Find To Location Tour Route

Testing Scenario	Expected Result	Result
Select each marker displayed in the map	Marker 1 displays the "Your position" snippet, marker 2 displays the "User Selected Tour Location Name" snippet in Menu Description Tour Location "	☒Success ☐Failed
Opens the route search menu to a user-selected tourist location according to the location of the tour displayed from the tour site description menu	The Route Search Menu to Tour Location works well, the map shows, is able to display two markers on the map, the green marker 1 points to the location of the device, the red 2 marker designates the user-selected destination location on the Menu Description of the Tour Location, displaying the path between marker 1 and marker 2	☒Success ☐Failed

V CONCLUSION

Based on the discussion and implementation that has been discussed in the previous chapters, it can be concluded about the application guidance of DKI Jakarta. This application is built using Java programming

language, with SQLite database and *utilizes* Android Studio as its IDE. Software development method used in this application development *is the waterfall* method. In this application there are several features that feature info view tourist location, feature see the location of the tour based on the user interest of the tour, the route search feature to the tourist location, as well as the tourist map feature of DKI Jakarta.

This application is able to recommend the tourist locations in DKI Jakarta according to the interest of the user along with information about the tourist locations in DKI Jakarta such as ticket price information, operational day and hours, reservation phone number, address and other information related to the location - tourist location in DKI Jakarta. The application has been made to facilitate the user to obtain information about tourist locations in the area of DKI Jakarta, which is expected to help improve the knowledge and interest of the community to tourism in Jakarta.

In addition, this application can help users to reach the tourist location by providing route guidance to tourist sites. This app development comes with locate route feature using Google Maps Android API and Google Maps Direction API. The results of implementation and testing of this Jakarta tourist guide application, it can be concluded that this application has been running well in accordance with the design of applications and expectations of the author.

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